DEPARTMENT OF ECONOMICS

WORKING PAPER SERIES

2002-09

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Consumption Inequality

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August 2002

1. Introduction

Other chapters in this volume have investigated inequality in earnings and household income. In this chapter we make the case that measures of consumption inequality are useful in addition to, or possibly instead of, measures of income inequality. We then outline the steps that are necessary to measure consumption inequality, focussing especially on the issues relating to the use of Canadian expenditure data. Finally, we apply these ideas to Canadian family expenditure data to measure consumption inequality in Canada by birth-year cohort over the period 1969 to 1999.

It is natural, at least for economists, to think of the material well-being of individuals as being determined by the goods and services which they actually consume in any period. Of course, wages, earnings and income are important determinants of this. We might think of a chain as follows:

Wages→Earnings → Income →Consumption→Material Well-being

The link between wages and earnings is mediated by labour supply responses. The link between earnings and income is mediated by the tax and benefit system, and by savings decisions made in the past. Similarly, the link between income and consumption is mediated by saving and borrowing decisions, which are determined by past and future needs, risks, and credit market conditions. Finally, the link between consumption and material well-being is mediated by many ill-understood (at least by economists) psychological factors.

An old line of macroeconomic research, initially spurred by Friedman (1957), argued that aggregate personal income ought to fluctuate more than aggregate personal consumption due to the fact that people can save in good times and borrow in bad times.

Recently, this argument has been brought to the forefront of the microeconomic literature on inequality. Applied researchers in Canada (Pendakur 1998, 2001), the United States (Cutler and Katz 1992; Slesnick 1991, 2001), the United Kingdom (Blundell and Preston 1996, 1998), Europe (Zaidi and de Vos, 2001) and Australia (Barrett, Crossley and Worswick, 2000) have outlined the following basic argument. At the micro level, families[1] choose consumption for any period (say, a year) based on their past history of income and needs, their future income and needs, and credit market conditions such as interest rates which determine how valuable saving is for future consumption.

Realistic models of how families allocate their resources through time are complex, but several features stand out. If a family faces a lot of random income fluctuation, but knows something about the frequency and severity of this fluctuation, then the family will try to save when incomes are high, needs are low or interest rates (the return to saving) are high, and it will try to borrow when incomes are low, needs are high or interest rates (the cost of borrowing) are low. There is also an implied negative correlation between consumption and future risk because prudent families save in the face of risk.

The relevance of all this to the measurement of inequality is fourfold. First, at the level of the family, within-period consumption may provide a better measure of material well-being than within-period income. Deaton (1996) summarized this view: “It is not

[1] The unit of analysis can be the family, the individual, the household or some other grouping of individuals. We will use the word `family' to indicate any individual or group of individuals who live together in a household and who are related by blood, adoption, marriage or common-law marriage. Of course, once the family is taken as the unit of decision, the question of how decisions are made arises. For the purposes of this paper, we assume that family consumption and allocation decisions are made for the equal benefit of all family members.

necessary to subscribe to the permanent income or life-cycle hypothesis to believe that consumption, rather than income, is the better indicator of household living standards, or to recognize that households take steps to smooth consumption over time."[2] Second, since we know consumption must vary with needs, comparisons of families with different needs must take account of this. Third, since we know that different birth cohorts face different interest rate histories, the most trustworthy and easy to interpret inequality measurement must be within birth cohorts. Fourth, the connection between consumption inequality and inequality in well-being may depend on how consumption responds to risk, and how well-being is affected by risk.[3]

Several papers that have estimated consumption inequality at the birth-cohort level. Blundell and Preston (1998) found substantial differences in growth in inequality over the 1980s across birth cohorts in the UK. Barrett, Crossley and Worswick (2000) found somewhat smaller differences across cohorts in Australia over the 1970s and 1980s. Although there has been much interest in cohort-level income inequality (eg,

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[2] Another argument for measuring resources with consumption rather than income is that the latter is better measured. This is often true in developing countries but less so in developed countries (except perhaps for the self-employed). See Deaton (1997) for further discussion.

[3] Some readers will be uncomfortable with inequality in "welfare", "wellbeing" or "material welfare" as the object of interest. An alternative is to take inequality in lifetime wealth as the object of interest. If banks are smart enough not to issue bad debts and families are not interested in bequesting resources, then families must make plans that equate their consumption in all periods with their lifetime income and wealth. Thus, if we had information on lifetime consumption or lifetime income, they would add up to the same thing: lifetime wealth. However, typical data are within-period rather than lifetime, giving information on consumption or income for, say, a month or a year. The same arguments about household smoothing income fluctuations suggest that within period consumption is likely a better indicator of lifetime wealth than within period income.

Beaudry and Green 2000), there has been no research on cohort-level consumption inequality in Canada.

Canada has appropriate data for the examination of consumption inequality. In the next section, we describe this data. Section 3 reviews the methodological and measurement issues that arise in measuring consumption inequality. In Section 4, we present estimates of consumption inequality in Canada by birth-year cohort over the period 1969 to 1999. Section 5 considers the last link the in the chain presented above: when is consumption inequality equivalent to inequality in economic resources or in well-being? Finally, section 6 concludes.

2. Household Consumption Data in Canada

The data used in this chapter come from the following public use sources: (1) the Family Expenditure Surveys 1969, 1978, 1982, 1986, 1992 and 1996; (2) the Surveys of Household Spending 1997, 1998 and 1999; and (3) Browning and Thomas "Prices for the Famex 1969 to 1996" (1999), with updates and extensions to rental prices from Pendakur (2001b).

The Family Expenditure Surveys (FAMEX) were conducted at irregular intervals between 1969 and 1996. In 1997, the Survey of Household Spending (SHS) replaced the FAMEX, and this survey has been conducted annually since. Both are cross sectional household surveys. The data are intended to be representative of all persons living in private households in the 10 provinces of Canada.[4] A principal use of national, cross sectional expenditure surveys is the construction of goods baskets for price indices, such

[4] Data are collected in the Territories but are not included in all the public use files.

as the Consumer Price Index. However, the micro-data are useful for many other purposes, including the one highlighted by this chapter.[5]

In contrast to many national cross sectional expenditure surveys, the FAMEX is not a diary survey.[6] Instead, face-to-face interviews are conducted in the first quarter of a year to collect expenditure and income information for the entire previous year. For example, the 1996 data are collected in January, February and March of 1997 but refer to the 1996 calendar year. Compared to diary procedures (which typically collect expenditures on non-durable items over short periods such as two weeks) this procedure may suffer from greater recall error (see Battistin 2002). On the other hand, short diaries suffer from problems of purchase infrequency that are not experienced by the FAMEX and SHS. Statistics Canada expends considerable effort to ensure that the data collected are of high quality. Households are often asked to consult bills and receipts, income is careful reconciled with expenditures and savings, and multiple visits to a household are sometimes used. Various checks on the data are undertaken by Statistics Canada.

The FAMEX and SHS data are generally thought to be of good quality. Statistics Canada has reported that the overall response rate is about 75%. With respect to item nonresponse, total income is imputed in about 1% of cases and some imputation of expenditures is required in about 12% of cases (excepting some components of clothing expenditure). Unfortunately, there is no flagging of imputation in the public use files.

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[5] These micro-data have been used for demand analysis by many researchers, and for analysis of specific policies, such as assessing the impact of the GST (sales tax) on families in Canada (Curtis and Kingston-Reichers, 2002).

[6] A well known example of a diary survey is the British Family Expenditure Survey. The American Consumer Expenditure Survey has both a diary and interview component.

The FAMEX and SHS are multistage stratified samples. The sampling frame for these surveys is the Labour Force Survey Sampling Frame, a feature they share in common with the Surveys of Consumer Finances, which are used in other chapters of this volume (Beaudry and Green Chapter). Low population regions (such as the Atlantic provinces) are over-sampled. Sample weights, but not cluster information, are included in the public use files. The omission of cluster information means that standard errors are underestimated.

Certain compromises are necessary to ensure that the pooled data represent a consistent sample through time. The most important issue is that in several years (1974, 1984 and 1990) a limited FAMEX was conducted only in 15 major urban centres. We have dropped these years from the analysis reported in this chapter.

Only regional analysis is possible in the FAMEX prior to 1992. Provincial identifiers are available in the 1992 and 1996 FAMEX, and in the SHS. One reason that this is important is that the estimation of a demand system (reasons to do this are discussed below) requires price variation and geographic variation is one source of price variation.

The unit of analysis for social welfare measurement is typically the individual. However, consumption decisions are usually made by groups of individuals. Such groups might be households, families or `spending units'. The grouping of individuals is typically constrained by the data, and Canadian expenditure data, `spending unit' consumption data is available to 1992 and `household consumption' data thereafter (the 'household' and the `spending unit' are slightly different concepts. However, by restricting our attention to families that were spending units alone in their household prior

to 1992 and households consisting of a single family 1992 and after, we can construct a consistent series. For consistency we must also restrict attention to 'whole year' households (in which all the members were present for the full year). These restrictions never exclude more than 10% of spending units or households, and in most years exclude somewhat less than 10%.

It remains to define birth cohorts for the analysis. Unfortunately, although birth-cohort is an individual-level concept, Canadian expenditure data do not provide individual-level age information---rather, these data provide the age of the household head and spouse (when present), usually bounded by top- and bottom-coding.[7] Thus, we attribute an age to each household. A common way to do this is to use the age of the household head. However, Statistics Canada's definition of a household head has changed through time. In order to have a consistent series, we take the woman as the head of all married couple families (regardless of whether Statistics Canada labels her the head or spouse). We then create ten-year birth cohorts beginning in 1884.

3. How Do We Measure Consumption Inequality?

The measurement of consumption inequality requires four important measurement choices. Researchers must choose:

- the consumption measure;
- an equivalence scale to adjust for different needs;

[7] If the ages of all members of the family were available, we could then impute equivalent consumption (defined below) to every member of the family, and then follow individual birth cohorts through time.

- a price index to adjust for differences in commodity prices across regions and time periods; and
- an inequality measure.

3.1 The Consumption Measure

The definition of the consumption measure is complex. Canadian expenditure data cover annual expenditures, but which expenditures should comprise annual consumption? Ideally, the consumption measure should capture all consumption flows used during the year and should not include any forms of savings or deferred consumption. Consumption flows must include all nondurable expenditures plus the consumption flows from durables. Savings and deferred consumption must include direct savings and also indirect savings such as life insurance premiums, lumpy durable expenditures and so forth.

Unfortunately, we are typically unable to perfectly separate durables from nondurables and unable to perfectly estimate the consumption flow from durables. In this research, we focus on nondurable consumption plus the imputed consumption flow from accomodation. Even with this narrow basket of consumption flows, we can't get at all nondurable consumption. Because we need price data to compute price indices (see below), we must restrict our attention to those commodities for which price data are available. Thus, in this paper, we use the following eight elements of nondurable consumption: (1) food purchased from stores; (2) restaurant food; (3) household

operation (including child care); (4) household furnishings and equipment;[8] (5) clothing; (6) private transportation operation;[9] (7) public transportation; and (8) personal care.

We also add the imputed consumption flow from accommodation. For rental tenure families, the accommodation consumption flow may be known, but for owner-occupier families, the accommodation consumption flow is not known, because for these families the flow of spending includes an investment component. Since many poor families---especially the elderly---own their accommodation, it is important to account for this. Further, since in some urban areas as many as 15% of rental tenure families live in subsidized or cooperatively owned housing (CMHC 1997), families may get a larger flow of consumption than their rental expenditures indicate. So, we impute the consumption flow from accommodation for all families.

As noted in Smeeding et al (1993) and Katz (1983), imputed consumption flows may be based on either the market value of the good or the opportunity cost of the capital embodied in the good (see Diewert 1974 or Yates 1994). In the former case, the researcher assigns the market value of housing, conditional on dwelling characteristics, to the family as its flow of imputed rent. In the latter case, the researcher assigns the opportunity cost, or alternative capital market return, of the capital implicitly invested in housing to the family as its flow of imputed rent. Smeeding et al (1993) impute consumption flows from owned accommodation based on the opportunity cost of home equity. Unfortunately, Canadian expenditure data lack information on home equity after

[8] Household furnishings and equipment includes an important durable component. However, we believe that these durables have a sufficiently high depreciation rate to merit inclusion in the consumption flow.

[9] Private transportation operation excludes all capital expenditures, such as car purchases.

1996. However, local housing costs can always be estimated by looking at what renters pay for accommodation. Thus, we use the market value approach.

We estimate the market value of accommodation as the average rent for accommodation in the same year and region (45 region-years) with the same number of rooms (1 to 11+ rooms).[10] We then assign the imputed market value of accommodation to each household instead of actual shelter expenditure.

3.2 Equivalence Scales and Price Indices

We adjust family expenditure for differences in prices with a price deflator and for differences in family size with an equivalence scale. Price deflators and equivalence scales are recovered from estimation of a consumer demand system. A consumer demand system is the micro-level relationship between expenditure shares on commodities, total expenditure, the prices of commodities and the demographic characteristics of families. For example, an estimated consumer demand system would give the magnitudes for statements saying how fast the food share of total expenditure declines with expenditure (since food is a necessity), rises with the price of food (since it is not substitutable) and rises with the size of the household (since food is not very shareable). This information can illuminate how an increase in the price of food would affect each household in the population. If a family spends a bigger share of its money on food, then an increase in the price of food hurts its more than it hurts a family that devotes a smaller fraction of its expenditures to food.

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[10] Pendakur (2001b) imputes separately for families living in cities with 30,000 or more residents and families living outside such cities. In the current paper, families in the

We adjust family consumption for differences in the prices faced by families in different years and regions by dividing family consumption by a `price deflator'. A price deflator gives the ratio of expenditure needs between a base price situation (in this case, that facing residents of Ontario in 1982) and an alternative price situation. Intuitively, the effect of a price change---for example, the increase in the relative price of shelter in Ontario between 1982 and 1992---on how much expenditure a household needs to maintain the level of well-being of its members depends on the share of expenditure commanded by that commodity. Since the share of expenditure on shelter---a necessity which is shareable---declines with total expenditure and with household size, an increase in the price of shelter hurts poor families more than rich families and small families more than large families. Thus, the price deflator must depend on prices, the total expenditure of the family and the size of the family.

Since consumer demand systems specify how expenditures are allocated across commodities, estimation of a consumer demand system reveals everything one needs to compute price indices. We use the demand system and price indices estimated in Pendakur (2001b), which are computed for the price situations in each of five regions in each data year, and which depend in addition on total expenditure and family size.

An equivalence scale gives the ratio of expenditure needs across household types. For example, if in some given year and region of residence, a couple with two children needs twice as much expenditure as a childless single adult to be equally well off, then we say the equivalence scale for the couple with two children is equal to two. An equivalence scale may also be revealed through the estimation of a consumer demand

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same region-year with the same number of rooms are assigned the same imputed rent

system, but unfortunately consumer demand estimation does not provide all the information necessary to construct an equivalence scale (for details see Donaldson and Pendakur 2002). If equivalence scales are allowed to vary arbitrarily with expenditure, then they cannot be identified from demand estimation alone. However, if equivalence scales are assumed to be the same for families at all expenditure levels, then they may be identified via consumer demand estimation (see Blackorby and Donaldson 1993; Pendakur 1999). We use the equivalence scale estimated in Pendakur (2001b). For families in Ontario in 1982, it is equal to family size raised to the power 0.46, or just a little less than the square root of family size.

The assumption that equivalence scales are the same for families at all expenditures levels is commonly used, and has the virtue of transparency. However, it is worth noting that it almost surely false. To see why, consider two households, one with children and one without. The former household will purchase some children's goods that the latter does not. For the equivalence scale to be independent of the level of expenditure, then the budget share of children's goods bought by the first household must also be independent of the level of expenditure. That is, all children's goods must be neither luxuries nor necessities. We know this to be false.[11]

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regardless of their city size.

[11] Interestingly, while the assumption that equivalence scales are independent of expenditure level cannot be confirmed by the data, it does have implications that can be tested. These implications are usually rejected. Some of these rejections might be attributed to the parametric assumptions used in the studies. In a semiparametric analysis, Pendakur (1999) does not reject the expenditure level independence of equivalence scales between childless families of different sizes, or between families with children of different sizes. He does however, reject the independence of expenditure level assumption for equivalence scales between families with and without children.

More recent research has developed ways to estimate equivalence scales which vary with expenditure and are thus different for rich and poor households. Donaldson and Pendakur (2002) show that if equivalence scales are assumed to be log-linear (iso-elastic) in expenditure, then they may be identified from behaviour alone. Donaldson and Pendakur (1999) also develop a similar framework for equivalence scales which the same for rich and poor households except for a fixed cost varying across household types. In these environments, equivalence scales vary with the level of expenditure (and thus material well-being), and childrens' goods may be luxuries or necessities. The empirical implementation of these methods is beyond the scope of this chapter.

3.3 Inequality Indices

For each individual in each family, we compute equivalent consumption as family consumption divided by the equivalence scale. We then compute real equivalent consumption as equivalent consumption divided by the price index. These individual-level observations of real equivalent consumption are the basis for our measurement of consumption inequality. Each individual in each family is assigned the family weight (which corrects for unequal sampling probabilities across regions and family sizes) and is assigned the real equivalent consumption for the family.

It is important to note that at the stage of inequality measurement, the unit of analysis is the individual. It is mathematically (though not conceptually) equivalent to treat the unit of analysis for inequality measurement as the family, with all the weights multiplied by the number of family members. (In fact, this is how we actually implement our analysis of individuals). Most welfare analysis in economics---such as utilitarian

social evaluation---takes the aggregation of well-being across individuals as the object of interest. This is because we believe individuals have well-being, but families and other groups don't. Thus, our object of interest is inequality among individuals, even though our data come in the form of family consumption.

Many researchers use the family as the unit of analysis for inequality measurement. In continental Europe (especially Germany), many researchers use the family as the unit of analysis with the weights multiplied by the equivalence scale. In the United States, many researchers use the family as the unit of analysis without multiplying the weights by anything. We believe both these approaches are wrong, and that the mistake stems from missing the point that inequality measurement motivated from social evaluation has as its object of interest the distribution of well-being among individuals.[12]

In this paper we use an Atkinson index of inequality the Gini coefficient of inequality, each computed over the equivalent real consumption of all individuals. These measures have two desirable characteristics. First, they are easy to explain to a wide audience. The Atkinson index is the proportional deviation of the average of consumption raised to a power from the average of consumption itself[13]. The power chosen determines the sensitivity of the measure to inequality at the bottom of the distribution, and we use a power of –2. The Gini coefficient is twice the area between the Lorenz curve for the actual population and the Lorenz curve for a population with

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[12] We further note that although inequality among families (as in the United States literature) may have some descriptive interest, it is hard to see what is interesting about inequality among `equivalence-scale weighted' families (as in the German literature).

[13] The Atkinson Index, I ,with parameter *r* is given by $I = 1 - \frac{N}{\sum y_j}\left(\frac{1}{N}\sum\left(y_j\right)^r\right)^{1/r}$ where y_j=1,…,N is the real equivalent consumption of individual j in a population of size N.

perfectly equal consumption. The Lorenz curve is the graph of cumulative consumption shares versus cumulative population shares.

Second, both indices have well-known asymptotic properties for the computation of standard errors and confidence bands (for the Atkinson indices, see Barrett and Doiron 1997, and for the Gini coefficient and related indices, see Barrett and Pendakur 1995).

4. Consumption Inequality in Canada, 1969 to 1999

Table 1 gives the number of observations of families in each birth cohort in each year. Most cohort- year cells have one to three thousand observations, which is enough to support the measurement of inequality within cells. The bottom row, labelled `all cohorts', and the final column, labelled `All Years', provide information on the number of observations available in the entire sample for each year and cohort respectively. We note that the eldest cohorts (top cells in each column) often have fewer observations, frustrating inequality comparisons as cohorts become elderly.

Table 1: Numbers of Observations by Birth Cohort and Year

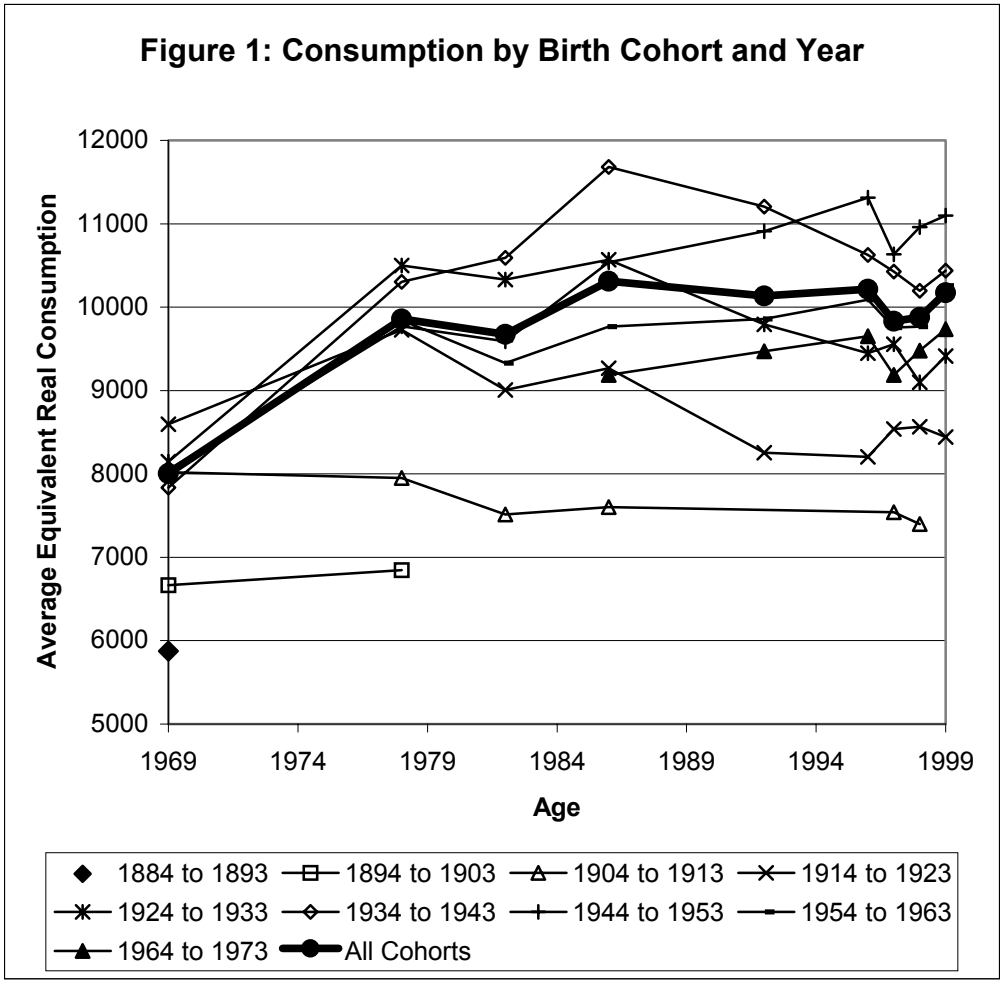
	Year									
Birth Cohort	1969	1978	1982	1986	1992	1996	1997	1998	1999	All Years
1884 to 1993	659									659
1894 to 1903	1246	451								1697
1904 to 1913	1979	863	1086	748			204	210		5090
1914 to 1923	2590	1207	1278	1138	1221	798	1254	907	1205	11598
1924 to 1933	2947	1352	1431	1331	1162	1191	1746	1492	1561	14213
1934 to 1943	3318	1521	1576	1391	1219	1277	2013	1698	1897	15910
1944 to 1953	1866	2331	2566	2225	1846	1988	3065	2504	2838	21229
1954 to 1963		944	2033	2392	2333	2413	3968	3273	3705	21061
1964 to 1973				319	1103	1809	3200	2447	2844	11722
All Cohorts	14605	8669	9970	9544	8884	9476	15450	12531	14050	

Table 2 gives the average real equivalent consumption for individuals in each birth cohort-year cell. Figure 1 shows this information graphically.

Table 2: Average Consumption by Birth Cohort and Year

	Year									
Birth Cohort	1969	1978	1982	1986	1992	1996	1997	1998	1999	All Years
1884 to 1993	5873									5873
1894 to 1903	6664	6847								6713
1904 to 1913	8020	7950	7513	7603			7541	7398		7794
1914 to 1923	8596	9729	9008	9269	8253	8203	8539	8564	8441	8737
1924 to 1933	8149	10499	10332	10568	9794	9447	9556	9100	9412	9473
1934 to 1943	7838	10304	10592	11681	11205	10626	10426	10195	10438	10053
1944 to 1953	8050	9772	9588	10537	10909	11312	10633	10958	11099	10363
1954 to 1963		9843	9329	9766	9858	10090	9756	9766	10258	9859
1964 to 1973				9187	9471	9650	9186	9480	9735	9479
All Cohorts	8006	9859	9676	10311	10135	10215	9832	9878	10173	

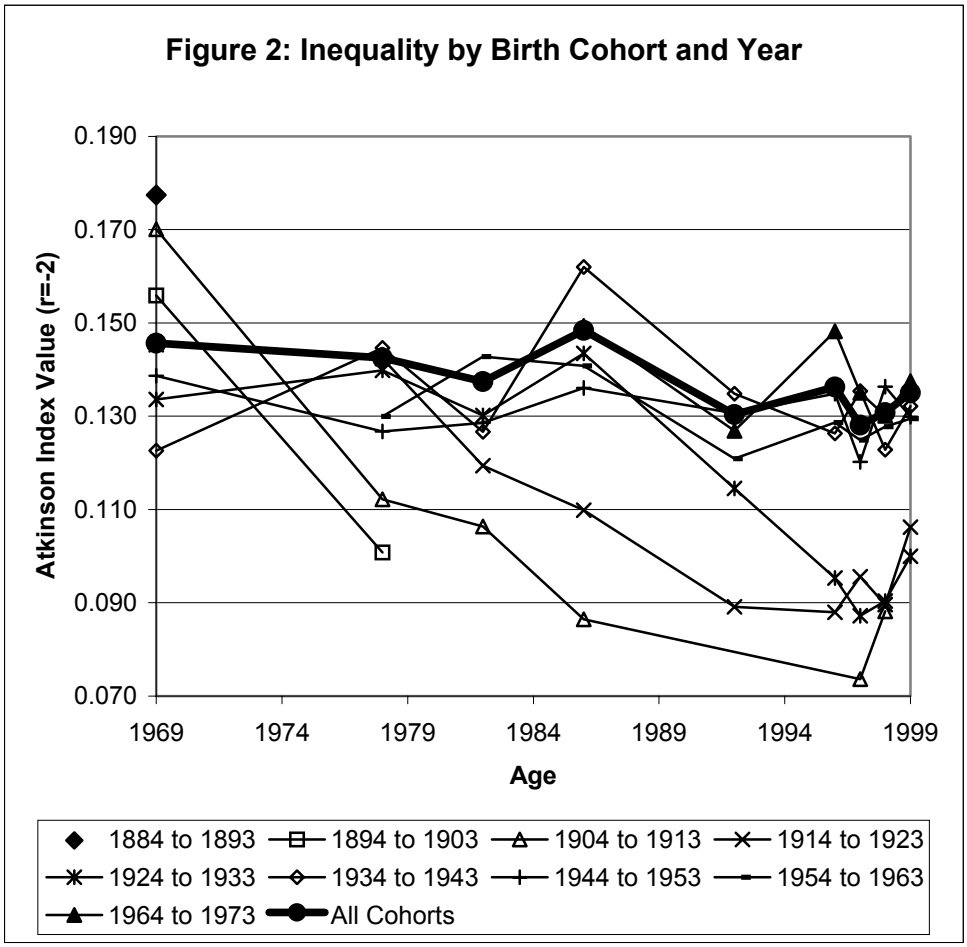
It is clear from Figure 1 that for most birth cohorts average consumption rose between 1969 and 1986 and then stayed static or fell between 1986 and 1999. The eldest birth cohorts show a slightly different pattern, with falling or static consumption over the entire period. These patterns confound both time and age effects, a point which we return to below. Nevertheless, these patterns for Canadian data are quite different from what Blundell and Preston (1998) find in the British data. They conclude that once demographic effects are controlled for with equivalence scales (as they are in this paper), within-cohort consumption growth is essentially nil.



We also note that some birth cohorts consume consistently more than other birth cohorts. People born in the earliest birth cohorts consume least in all years. Families whose heads were born between 1934 and 1953 seem to consume more than all others, especially in the later years. Again, these patterns may confound at least two different effects. They may be cohort differences, or they may include age effects (as over the time span of the data, we observe different cohorts over different age spans).

Table 3 and Figure 2 give the estimated Atkinson index value (with r=-2) for real equivalent consumption for each cohort in each year. The estimated standard errors (not reported) range from 0.002 to 0.004 for cohorts with more than 1,000 observations.

Table 3: Atkinson Index Values (r=-2) for Consumption by Birth Cohort and Year									
	Year								
Birth Cohort	1969	1978	1982	1986	1992	1996	1997	1998	1999
1884 to 1993	0.177								
1894 to 1903	0.156	0.101							
1904 to 1913	0.170	0.112	0.106	0.086			0.074	0.088	
1914 to 1923	0.145	0.142	0.119	0.110	0.089	0.088	0.096	0.090	0.106
1924 to 1933	0.134	0.140	0.130	0.143	0.115	0.095	0.087	0.090	0.100
1934 to 1943	0.123	0.145	0.127	0.162	0.135	0.126	0.135	0.123	0.132
1944 to 1953	0.139	0.127	0.129	0.136	0.131	0.135	0.120	0.136	0.130
1954 to 1963		0.130	0.143	0.141	0.121	0.129	0.125	0.128	0.129
1964 to 1973				0.149	0.127	0.148	0.135	0.130	0.138
All Atkinson	0.146	0.143	0.137	0.148	0.130	0.136	0.128	0.131	0.135
All Gini	0.176	0.180	0.175	0.185	0.173	0.176	0.169	0.173	0.175
All Atkinson (1992=100)	112	109	105	114	100	105	98	100	104
All Gini (1992=100)	102	104	101	107	100	101	98	100	101



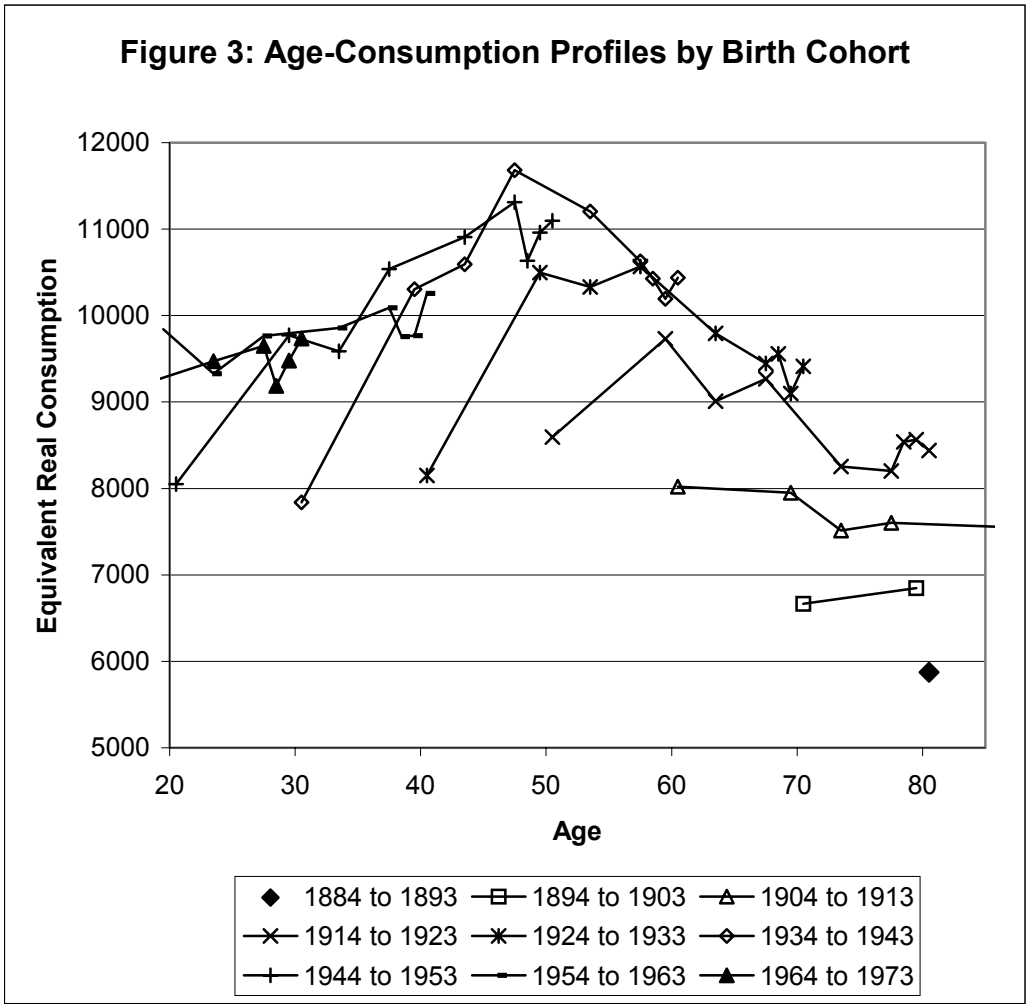
The thick black line in Figure 2 shows the path of real equivalent consumption inequality for all individuals taken together over 1969 to 1999. Inequality declined over the 1970s, rose to 1986, and then declined in the 1990s. There is also some evidence of increasing inequality in the late 1990s, where the level of inequality rose from 0.128 in 1997 to 0.135 in 1999. This increase is statistically significant (with a t-value of 8), but is small relative to earlier movements and is potentially contaminated by the (minor) changes in survey design between the FAMEX and SHS.

Looking at the results for different cohorts, we see that pooling together all the cohorts masks some differences between them. In particular, consumption inequality is quite strongly declining over time for the eldest three birth cohorts. In contrast, for the youngest five cohorts, inequality seems much more stable over time. Given that confidence bands are approximately one percentage point wide, the youngest five birth cohorts seem to have relatively constant consumption inequality, especially over the early years.

The increase in inequality over the late 1990s seen for all cohorts pooled together, however, does not seem to hide differences across cohorts. All cohorts experienced an increase in inequality over this period, although it is not statistically significant for many of them.

One may also compare the levels of inequality across cohorts (more on the meaning of this below). The youngest cohort (to which both authors belong) has higher inequality than other cohorts in the late 1999s. Prior to that, it seems to be the two cohorts born between 1934 and 1953 (the wealthy cohorts from Figure 1) that exhibit the most consumption inequality.

We can re-arrange the information in Tables 2 and 3 by looking at age-consumption profiles and age-consumption inequality for different birth cohorts. Figures 3 and 4 show the average consumption at each age (with ages being the mid-points of the appropriate ranges) and the level of consumption inequality at each age for each birth cohort.

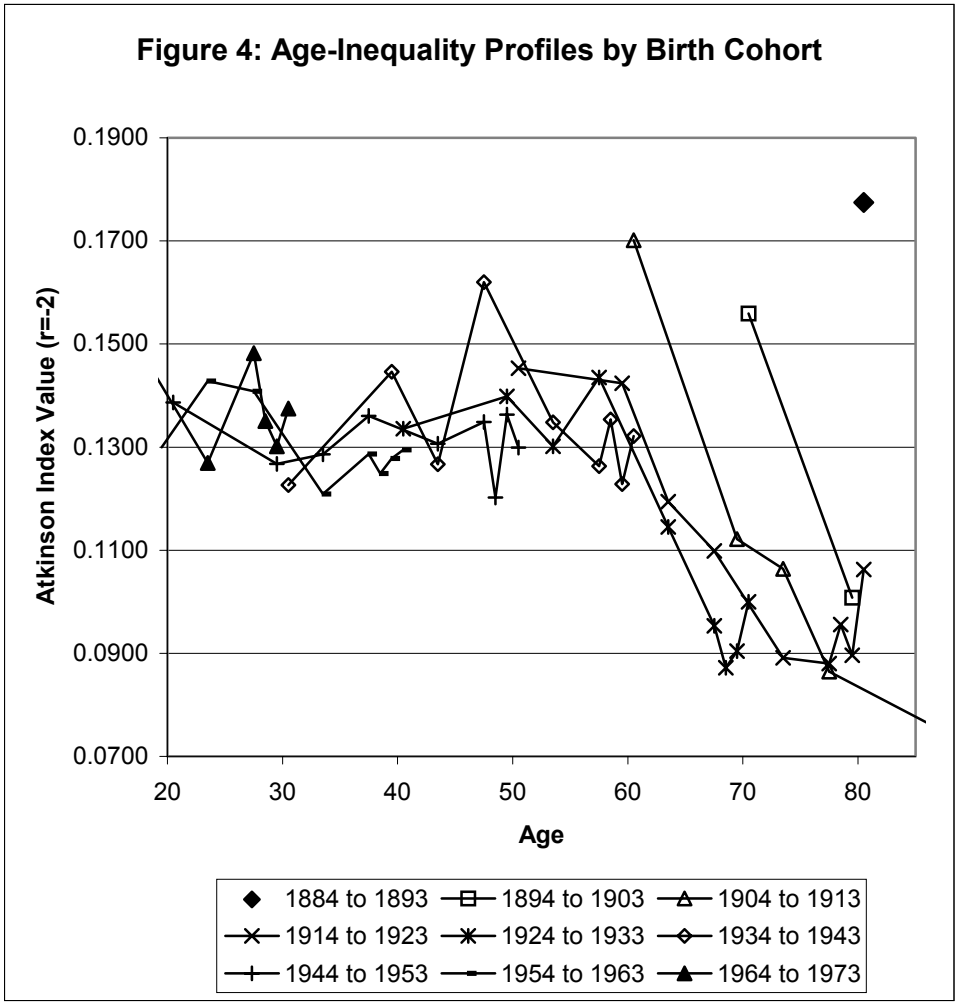


In Figure 3, one can see the hump-shaped profile that is associated with earnings over age reproduces itself in consumption over age. This is somewhat surprising given that families are presumed to dislike fluctuation in their consumption. However, its important to note that what life-cycle theory predicts is that households smooth marginal

utility, not consumption. It is possible that marginal utility is constant over age if the observed movements in consumption are offset by changes in labour supply, or by demographic effects that are not captured by our equivalence scale, or by other factors. For example, Browning and Ejrnaes (2002) show that the hump shape in British consumption data is removed by more detailed adjustments for needs (particularly, taking account of not just household size but also the number and ages of children present). For a detailed discussion of possible interpretations of the age profile of consumption levels, see Browning and Crossley (2001).

Turning to cross – cohort comparisons, we see again that the eldest cohorts consume less at all ages. The life-cycle theory interpretation of these cohort effects is that they reflect productivity growth. Younger cohorts are wealthier in a lifetime sense. If this interpretation is correct, then the smaller cohort effects to the left hand side of the figure would be consistent with a slowdown in productivity growth at the end of the 20th century

The pattern of higher consumption for those born between 1934 and 1953 seen in Figure 2 is somewhat attenuated in this view of the data. These cohorts have somewhat higher consumption conditional on age, but much of the difference seen in Figure 2 is driven by the hump-shape of the consumption-age profile. There is some evidence in Figure 3 that the younger two cohorts have slower consumption growth over age than the high consumption cohorts. However, the overall impact of this is diminished by the fact that these younger cohorts also have higher consumption at the start of their lives.



Turning to the age-inequality profile, Figure 4 puts a new light on the patterns of inequality across cohort. Inequality seems to decline with age after about 50 years old for all cohorts. This pattern is difficult to interpret. As noted by Deaton and Paxson (1994) if households experience uninsurable shocks then differences in lifetime resources should accumulate through time and, for a given cohort, inequality should grow with age.[14] If households are fully insured, then inequality should be constant.[15]

[14] For example, in a simple permanent income model consumption follows a random walk so that the variance grows with age.

[15] This assumes that preferences over consumption at different ages are homothetic (for example, additive with a CRRA within period utility function). More on this in Section 5.

The observed pattern may reflect a data problem. One such possibility is that it is generated by differential mortality. There is a well known association between socio-economic status and measures of health, including mortality. It may be that as each cohort ages, the bottom of the distribution experiences greater mortality, so that our repeated cross sections exhibit the decreasing inequality of survivors. A second possible explanation is that our consumption bundle (comprising 7 goods and imputed services from housing) represents a different approximation to total consumption of goods and services a different ages.

As with the levels, the observed pattern may suggest that our adjustments for differences in needs are inadequate. As each cohort ages the variance of household size decreases, so that if our equivalence scale does not properly adjust for differences in needs across different household sizes, this could generate a spurious decline in consumption inequality.

Turning to cross-cohort comparisons, the eldest three cohorts seem to have the highest levels of inequality for their age. Comparisons across birth cohorts, however, are only interesting if we believe that the distribution of material well-being relates to the distribution of consumption the same way in both cohorts. The reasonableness of this assumption is one of the issues we consider in the next section.

5. When Is Consumption Inequality Revealing of Economic Inequality?

Finally, we consider the last link in the chain we presented in the introduction: the link between consumption inequality and the object of ultimate interest: economic

inequality or inequality in material well-being. Here there are two issues. First is the link between our the consumption measure, based on household spending on a limited range of goods, and total individual consumption on goods and services. Second is the link between individual consumption in a given period, and that person's level of material well-being.

In this paper we have examined components of nondurable consumption, as well as imputed consumption flows from accommodation. As noted above this is only a proxy for total consumption. The latter should include all nondurable consumption and flows from all durables. Moreover, individuals certainly derive well-being from the consumption of public goods and services, and access to such goods and services is probably not equally distributed. Thus public goods and services provide another wedge between consumption inequality as we can measure it with expenditure data, and inequality in total consumption.

Throughout this chapter we have assumed that family consumption and allocation decisions are made for the equal benefit of all family members. Of course this may not be the case, and there is increasing empirical evidence that it is not the case (See for example, Browning et al. (1994) and Lundberg et al. (1997)). Thus inequality of individual consumption likely arises both as a consequence of inequality between households and because of inequality within households. The latter is extremely difficult to assess, because with household level expenditure data it is very difficult to credibly attribute observed expenditures to the consumption of particular individuals. Haddad and Kanbur (1990) provide one analysis of intra-household inequality, with data on individual food consumption from a developing country.

Beyond these issues, we can ask: if we perfectly observed the total consumption of individuals in a period, would that reveal inequality in well-being? Blundell and Preston (1998) investigate the conditions under which the consumption of a family---suitably adjusted for differences in needs and prices across families---provides an ordinal measure of material well-being for that family. They show in a model with certainty and perfect credit markets---where people face no risk and so have perfect information about their future incomes, needs and interest rates, and where they are able to borrow and save as they see fit---the consumption profile over the life-cycle will be sometimes high and sometimes low. Consumption will be high when needs are high or when interest rates are low; consumption will be low when needs are low or when interest rates are high. This means that consumption cannot be used as a measure of well-being comparable across age because the optimal consumption profile over age might be tilted. Neither can it be comparable across birth cohort because interest rate histories are different. In a certain world, consumption can only be used as an ordinal measure of well-being within age groups and birth cohorts.

However, even if consumption is an ordinal measure of well-being within age groups and birth cohorts, that doesn't mean that inequality of consumption neccessarily captures inequality of something we care about. Pendakur (1998) shows that, given certainty and perfect credit markets, if families exhibit constant relative risk aversion (CRRA), then the value of an inequality index computed over consumption is equal to the value of that same inequality index computed over unobservable lifetime wealth. This is because, if families exhibit CRRA, any increase in lifetime wealth results in a proportionate increase in consumption over the entire lifetime consumption profile.

Since relative inequality indices---a class which includes all commonly used inequality indices like the Gini coefficient and the Atkinson indices---are insensitive to proportionate increases in consumption, this implies that consumption inequality is lifetime wealth inequality.

CRRA is a strong restriction. It requires that rich and poor families have the same distaste for proportionate fluctuations in consumption. Browning and Crossley (2000) argue that since rich families buy luxuries and poor families buy neccessities, a 10% loss in consumption must hurt poor families more than rich families, so the CRRA cannot be true---the distaste for proportionate fluctuations should be lower for rich families. However, CRRA is testable in this context. Assuming certainty and perfect credit markets, CRRA also implies that consumption inequality must be constant over time within birth cohorts. The results presented in Figure 2 suggest that CRRA might be true for the younger six cohorts, but not for the eldest cohorts.

In an uncertain world---where people face risk and so do not have perfect knowledge about their future path of income, needs and interest rates---inequality measurement is considerably more complicated. Even comparisons within age groups and birth cohorts are frustrated by the fact that people face different risks and thus will have different savings behaviour. Within a birth cohort and age group, having high consumption could be due to having low risk or high wealth. Of course, low risk and high wealth are both good things. Blundell and Preston (1998) investigate conditions under which consumption increases due to increased wealth are associated with the same utility difference as consumption increases due to decreased risk. They find that this is the case if and only if families exhibit constant absolute risk aversion (CARA). If

families exhibit CARA, then any family with a consumption level of x is exactly as well-off in a lifetime sense as any other family with that same consumption level, regardless of whether that consumption choice is driven by risk or by wealth. Unfortunately, CARA is a very strong restriction, since it requires that rich and poor families have the same distaste for fixed dollar fluctuations in consumption. Thus, Blundell and Preston conclude that uncertainty makes comparison of material well-being using consumption measures impossible, even within age groups and birth cohorts.

Measures of consumption inequality are a useful complement or even alternative to income or earnings inequality. Because households do take some steps to smooth consumption (see Browning and Crossley (2001) for evidence on this point), consumption inequality is probably the better measure of inequality in well-being or economic resources. The discussion above highlights the fact that consumption inequality is not a *perfect* measure of inequality in well-being, and that comparisons of consumption inequality (including comparisons across ages, cohorts, or risk levels) should be taken with some care. However, similar considerations apply to comparisons of inequality in income or earnings.[16]

6. Summary and Conclusions

[16] In considering the limits to interpreting consumption inequality as inequality in well-being, Blundell and Preston (1996) note that "None of these arguments offers reasons to prefer income, against which equally pertinent points could be made."

Income and earnings inequality are important factors driving inequality in material well-being. Because households can, and to some extent do, borrow and save to move resources between periods, inequality in consumption (that is, in the resources that households actual expend) may be a better proxy for inequality in material well-being. Of course, even the connection between consumption and well-being is complicated, and the role of responses to interest rates and uncertainty must be kept in mind. Nevertheless, measures of consumption inequality are an important compliment to studies of income and earnings inequality, and help fill out our picture of what might be broadly termed "economic inequality".

Canada has suitable data for the study of consumption inequality: the Family Expenditure Surveys and their descendants, the Surveys of Household Spending. As with income or earnings, it is necessary when studying consumption inequality to make adjustments for the different prices that households face (with a price index) and for differences in needs that arise from their differences in size and composition (with an equivalence scale). Expenditure data can be used to help determine reasonable price indices and equivalence scales.

Using these data and methods we have examined the age pattern of average consumption levels, and consumption inequality, for different birth cohorts of Canadians. We find that overall consumption inequality has fallen slightly over last thirty years. There seems to be an increase in the late 90s though this movement is of similar magnitude to earlier survey-to-survey movements. It remains to be seen whether this recent upturn develops into a trend, but both researchers and policy makers will undoubtedly wish to follow future developments in consumption inequality closely.

Within cohorts we observe a pattern of fairly constant inequality until retirement, and then substantial decreases in inequality. The explanation of these patterns is a topic of ongoing research.

Acknowledgments

We have benefited from many conversations with our friends and colleagues: Martin Browning, Richard Blundell, Ian Preston, Garry Barrett, Federico Perali, and from conference participants at UBC and seminar participants at the Institute for Social and Economic Change, Bangalore, India. We would also like to gratefully acknowledge the financial support of the Social Science and Humanities Research Council of Canada.

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